



Australian Bureau of Statistics

1301.0 - Year Book Australia, 1990

ARCHIVED ISSUE Released at 11:30 AM (CANBERRA TIME) 01/01/1990

THE GREAT BARRIER REEF MARINE PARK- CONSERVATION AND MANAGEMENT IN THE MARINE ENVIRONMENT

This article has been contributed by the Great Barrier Reef Marine Park Authority.

THE GREAT BARRIER REEF - WORLD HERITAGE SITE AND MARINE PARK

Scattered over a distance of 2,300 kilometres, from the middle of Australia's eastern coast northwards to Papua New Guinea, lies the Great Barrier Reef. Not really a continuous barrier but a collection of about 3,400 separate coral reefs, shoals and other formations, it is the largest system of coral reefs in the world.

About 2,900 reefs, including 760 fringing reefs, lie within a formally defined area known as the Great Barrier Reef Region which has the tip of Cape York as its northern boundary (see Figure 1). With an area of about 350,000 square kilometres the Region is considerably larger than the combined areas of Victoria and Tasmania, although only approximately nine per cent (31,500 square kilometres) is composed of reefs. Within this Region there is great variety in structure and life form. There are some 300 reef islands or cays; 87 of them permanently vegetated. There are about 600 continental or high islands often with fringing reefs around their margins.

This range of reef and island structures is small compared with the diversity of Reef fauna. An estimated 1,500 species of fish and more than 300 species of hard, reef-building corals are known; more than 4,000 mollusc species and over 400 species of sponges have been collected. Six species of turtle and the dugong, an endangered herbivorous marine mammal, also occur in the Region; as do more than 240 species of birds.

Several Great Barrier Reef islands have middens or other sites of Aboriginal and Torres Strait Islander origin, as well as ruins and operating lighthouses of historical and cultural significance. There are also more than 30 known historic shipwrecks.

However, it was primarily for the unique combination of biological diversity and size that the Great Barrier Reef was selected and placed on the UNESCO World Heritage List in 1981 (1).

Australia had already taken action to protect the Reef when it established the Great Barrier Reef Marine Park in 1975. The Marine Park is a multiple-use management approach which aims to achieve reasonable use consistent with conservation. **The Great Barrier Reef Marine Park Act 1975** anticipated the 1981 World Conservation Strategy (2) and it may be unique in providing specifically for conservation and reasonable use, or sustainable development of a large area of recognised conservational significance.

The Marine Park overall conforms to Category VIII of the classification system for protected areas used by the International Union for the Conservation of Nature and Natural Resources (IUCN). It also meets the criteria for selection and management as a Biosphere Reserve

(Category IX), although it has not been formally proposed or established as one.

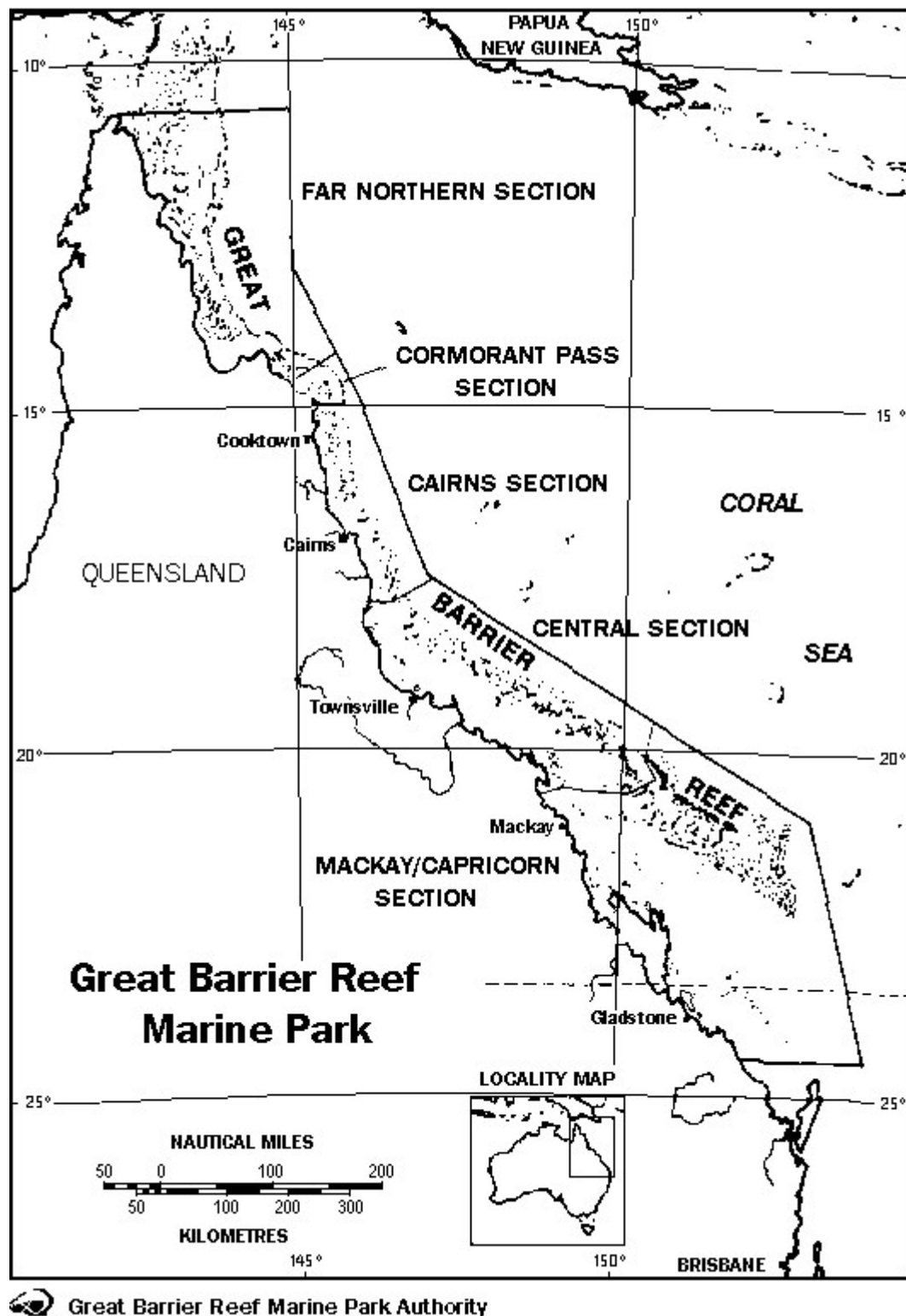


FIGURE 1

NOTE: The Marine Park comprises about 98.5 per cent of the area of the Reef Region

THE GREAT BARRIER REEF MARINE PARK - HISTORY OF ESTABLISHMENT

The Region has long been used as a source of food and raw materials. The Great Barrier Reef or parts of it were explored and used by indigenous people for fishing, hunting and collecting many thousands of years ago.

Since the arrival of Europeans, the Reef has been used for commercial enterprises based on harvesting its natural resources: beche de mer, turtles, scallops, prawns and pelagic and demersal fishes. The beche de mer and trochus fisheries were particularly important and have at times involved considerable work forces. Records for 1881 show that some 250 tonnes of dried beche de mer were exported. Today the beche de mer fishery is non-existent and the trochus industry very small.

The Reef has also been a supplier of non-living resources. For example a number of cays, including Raine, North-West, Fairfax and Lady Elliott Islands, were mined for guano or phosphate rock in the second half of the nineteenth century. The operations were considerable. They involved substantial work forces (there were 112 people on North-West Island in 1897) and removed large quantities of topsoil and rock.

Before Federation in 1901, the Great Barrier Reef was administered by the Colony of Queensland. After Federation this arrangement continued largely unchanged, except that the new Federal Government was given the responsibility for fisheries beyond the 3 mile Territorial Sea and for navigation.

Up until the early 1970s, fishing and collecting were the major activities in the Great Barrier Reef. There was a small but growing tourist industry. Most activities were located close to the mainland and near population centres: few people had access to areas further offshore.

Serious conflict on and about the Reef and its management first arose in the 1960s when the people of Australia became aware of, and objected to, proposals to drill for oil and to mine limestone on the Reef. The ensuing controversy revealed that the Reef was treasured by many Australians for its uniqueness, biological diversity, beauty and grandeur. (3)

In 1973, the Commonwealth Parliament passed the Seas and Submerged Lands Act which established overtly Commonwealth jurisdiction over, and title to, the sea bed below low water mark outside State internal waters. This Act was challenged by some of the States but its constitutional validity was upheld by the High Court in 1975.

In the same year, the Commonwealth Parliament passed, with the support of all major political parties, the Great Barrier Reef Marine Park Act which provided for the 'establishment, control, care and development of a marine park in the Great Barrier Reef Region', and gave responsibility for the establishment of the Marine Park and the development of management strategies to the Great Barrier Reef Marine Park Authority.

The 1975 Act represented the culmination of efforts by many people, both within Australia and overseas, concerned about the long-term survival of the Reef in the face of the rapidly increasing development of reef-related industries. Of particular concern was the potential threat to the Reef from mining for limestone and other minerals and oil drilling. Other concerns included the need for environmental controls over expansion of commercial fishing, over the development of a major tourist industry and over impacts reaching the Reef from terrestrial activities. (4)

THE MARINE PARK AND ZONING SYSTEM

The Great Barrier Reef Marine Park is not a National Park. While the prime objective is conservation, the Authority is also required to make provision for reasonable use of resources, for the enjoyment of the public, for research and for preservation. This is achieved in the first instance through zoning.

Through the use of zoning, conflicting activities are separated, areas are provided which are

suitable for particular activities and some areas are protected from use. Levels of protection within the Park vary from almost complete absence of restriction on activity in 'General Use' zones to 'Preservation' zones in which almost no human activity is permitted. The only activities which are prohibited throughout the Park are oil exploration, mining (other than for approved research purposes), littering, spearfishing with scuba and the taking of large specimens of certain species of fish.

In the zoning plans which have been developed so far, there are three major categories of zones:

Preservation zones and Scientific Research zones

Equivalent to IUCN Category I Scientific Reserve/Strict Nature Reserve. Only scientific research permitted.

Marine National Park zones (there are 3)

Equivalent to IUCN Category II, National Park. Major uses permitted are scientific, educational and recreational.

General Use zones (there are 2)

Equivalent to IUCN Categories IV, Managed Nature Reserve and VI, Resource Reserve. They aim to maintain sustainable use levels. Commercial and recreational fishing are generally permitted, although bottom trawling is prohibited in one of these zones.

The zones are fixed during the life of a zoning plan (generally five years). They are complemented by generally smaller areas which give special protection from time-to-time to animal breeding or nesting sites, to sites in General Use and other zones which are required to be protected to allow appreciation of nature free from fishing or collecting and to sites suitable for scientific research.

The pattern of zones within a plan as far as possible avoids any sudden transition from highly protected areas to areas of relatively little protection.

The first zoning plan for a section of the Marine Park (Capricornia) came into effect in 1981 and the initial zoning of the whole Park was completed in 1988.

The Marine Park is currently divided into four sections shown in the following table.

GREAT BARRIER REEF MARINE PARK MANAGEMENT SECTIONS

Section	Area (km ²)	Year proclaimed	Year plan began operation
Cairns/Cormorant Pass	35,000	1981	1983
Far Northern	83,000	1983	1986
Townsville/Whitsunday	77,000	1984	1987
Mackay/Capricorn (a)	149,000	1984	1988

(a) Subsumed Capricornia Section, which had a zoning plan in operation from 1981 to 1988.

INFORMATION FOR PLANNING AND MANAGEMENT - THE ROLE OF RESEARCH AND PUBLIC PARTICIPATION

The information on which zoning plans are based is obtained from technical literature, specialist reports and from submissions from interested persons and organisations, especially during programs specifically directed at encouraging community involvement.

Formal research provides information on the ecological characteristics of the Reef which need to be known as a reference point for the monitoring of the possible changes resulting from human activities. Similar information is also required to predict, at least in approximate terms, the type and scale of effect likely to result from individual or combined activities. The development of monitoring programs assists our understanding of reef processes and of the effects of management.

In recognition of the ever-increasing level of understanding of reef processes and the evolving new activities and industries in the Reef Region, zoning plans are publicly reviewed about every five years.

The second major source of information about the Reef is interested persons and organisations. As a statutory obligation, but particularly as a preferred mode of operation, the Authority actively involves the community in planning the Marine Park. It does so primarily through specifically designed public participation programs. These occur in at least two stages in the setting up of an operational Marine Park section: firstly, at a general information gathering phase when a section has been declared but not yet zoned, and secondly, when a proposed zoning plan has been drawn up for the section and is released for public review.

In the light of the representations received at the second stage the zoning plan is revised. When this revised plan has been the subject of subsequent ministerial and Commonwealth parliamentary review; it comes into effect on a specified date. Thereafter a continuing program of extension and community education takes place.

A third source of information is the permit system. Permits are required for many activities to proceed in the Marine Park including tourist facilities and programs, education and research programs, aircraft operations, discharge of waste, collecting, installation and operation of moorings and traditional hunting and fishing. This system allows intended activities to be identified; the potential impacts assessed; if approved, have conditions imposed, and effects monitored. Most permits require renewal after 12 months.

The permit system was instituted to encourage responsible behaviour in users, separate potentially conflicting uses, gather data for management and place reasonable limits on particular operations, consistent with sustainable use.

MARINE PARK MANAGEMENT

The Federal and Queensland governments have agreed that the day-to-day management of the Marine Park, using the framework of sections and zoning plans, should be undertaken by Queensland Government agencies, principally the National Parks and Wildlife Service, subject to the Authority.

The Queensland National Parks and Wildlife Service is already responsible for managing numerous island national parks within the outer boundaries of the Region, as well as State marine parks.

A recent restructuring of the Queensland National Parks and Wildlife Service has led to increasing emphasis on the regional management of sections of the Marine Park. Day-to-day management will be directed from regional offices at Cairns, Townsville and Rockhampton with a

number of smaller sub-regional offices in appropriate coastal towns.

Under a Commonwealth-Queensland agreement, costs for management in the Great Barrier Reef Marine Park are shared. The purchase of accommodation, boats, equipment and other capital costs are met by the Commonwealth for the first three years or so. Replacement capital and running costs, which include rent, salaries, fuel and communications, are shared equally by the two governments.

Management by education is a major focus of the Authority. While there must be regulations and penalties, ultimate success in conserving the Great Barrier Reef depends upon genuine community understanding and acceptance of the need for self-regulation and adherence to the provisions of zoning and management plans. As well as tapping the tremendous store of Reef knowledge held by the community, public participation contributes to the acceptance of zoning and management plans.

The authority's education and information program produces materials and programs for community education and assists operators in the tourism industry with the development of visitor programs which are conservationally and educationally focused.

The Authority also operates a major aquarium housing a living coral reef in Townsville. The Great Barrier Reef Aquarium is enabling visitors to the Reef Region to gain a greater understanding and appreciation of the Reef and its management as a Marine Park. While the Aquarium provides a 'reef experience' in itself, it also encourages visitors to experience the 'real thing', with care for the environment brought about by greater understanding.

MANAGEMENT - MODERN REEF BASED INDUSTRIES

Today, the three major industries of the Great Barrier Reef, in terms of people employed and annual turnover, are tourism, recreational fishing and commercial fishing.

Tourism (encompassing the provision of accommodation, transport and recreational activities) is the fastest growing activity. The popularity of the Reef and adjacent coast region as a tourist destination increased forty-fold between 1940 and 1980 and continues to increase. In 1989, tourism to the Reef was estimated at 2.1 million visitor days a year. The Cairns area has seen rapid increases with organised tourism on reefs close to Cairns estimated to have grown by 30 per cent per annum between 1986 and 1989.

Tourism and recreation activities extend along most of the length of the Great Barrier Reef but have been focused in the Cairns, Townsville, Whitsunday Islands and Gladstone areas. The major activities are summarised in the following table.

MAJOR TOURISM AND RECREATION ACTIVITIES IN THE GREAT BARRIER REEF MARINE PARK

Structure/Activity	Began	Current number
Island resorts	1932	27
Resort capacity (beds)	1932	5,300
Bareboat charters	1978	>130
Large catamarans	1980	30
Pontoons	1982	20
Floating hotels	1988	-
Private boat use	..	20,000

The Reef Region supports a number of significant recreational and commercial fisheries including prawn trawling, trolling, line fishing, crabbing, collection of aquarium fish, corals, shells, trochus and beche de mer.

It is estimated that half the commercial Queensland fish catch is taken from within the Great Barrier Reef Region. Recreational fishing tends to concentrate on stocks close to the coast and takes a higher percentage of the catch than commercial fishing in these areas.

MANAGEMENT- PROBLEMS AND RESPONSES

One outcome of these activities has been increasing competition for the use of limited desirable sites, leading to increasing conflict between competitors for the same type of use, and competition for different types of use. For example, a large tourist pontoon is incompatible with commercial fishing or a small dive operation. Sites suitable for reef based tourist activities are usually determined by distance from a population centre, protection from the weather and quality of the reef in terms of coral cover and fish abundance.

Concern to prevent unacceptable ecological impact is paramount in the Authority's management of tourism development. The types of biophysical environmental impacts which may be associated with reef-based tourism operations include: discharge of waste, litter and fuel; physical damage to reefs from anchors, people snorkelling, diving and reef walking; disturbance of fauna (especially seabirds); and over-fishing or collecting. All of these may be managed to some extent by design, prohibition or limitation.

The permit system has an important role here. All tourist activities require a permit, and while the assessment and issuing of permits has become a large administrative burden, it does provide, through attached conditions, the means to control activities and limit effects. It has become a practice to specify conditions that relate to all aspects of an operation, including limits on the number of people allowed on a site and what they can do there.

It is considered that some uses of parts of the Reef have already reached levels that appear to exploit fully the productive capacity of the system e.g. bottom trawling for prawns. A decline in the average size of reef fish landed from charter boats indicates reef fishing is also affecting stocks. (5)

Run-off from islands and the mainland contains suspended solids, herbicides, pesticides, and nutrients. It is likely to have effects on the Reef but the magnitude of the effects, and whether these effects represent a real threat to the Reef, is not yet known. The Authority is funding a program to determine more precisely the origins and amounts of nutrients that enter the Marine Park.

The table below summarises management problems relating to major activities which occur within the Great Barrier Reef Marine Park, and how the Authority has attempted to contend with these problems or threats. (6)

Whilst the following represent some of the major problems that the Authority has had to contend with in recent times, there are many other problems that arise, some of which are inherent in being a bureaucracy, particularly one that has to deal with two levels of government -- the Commonwealth and Queensland. A continuing problem for the Authority is to overcome the tendency of any bureaucracy to either over-regulate or to become complacent and allow industry to degrade the environment.

MANAGEMENT PROBLEMS AND RESPONSES

Activity	Commercial and recreational fishing and collecting
Threats/Problems	Stock depletion; destruction of habitat; competition with other uses; increasing levels of activity -- recreational fishing is increasing at a rate of about 7 per cent per year, increasing costs; conflict between users; resistance to management.
Management Response	Identify and monitor available resources; attempt to maintain effect within the capacity of resource stocks; separate conflicting operations; ensure effective education and extension; carry out research on which to base management decisions, in cooperation with the fishing industry and agencies.
Benefits	Medium and long-term sustainable levels of activity identified; reduced conflict through separation of conflicting activities; cooperation in obtaining effective management; short-term disbenefits as regulation affects users who have not been affected before.
Activity	Private recreation (not fishing or collecting)
Threats/Problems	Scarcity of attractive, accessible sites; competition by both compatible and incompatible uses for suitable sites; overcrowding; loss of amenity; destruction of coral and other reef life.
Management Response	Separate incompatible activities; provide information to improve understanding and minimise impacts; limit site use to sustainable levels.
Benefits	Reduced competition and conflict; sustainable activity; increased enjoyment through improved information.
Activity	Tourist programs and developments
Threats/Problems	Large volume use of accessible sites; competition with existing uses.
Management Response	Allocate sites on the basis of suitability; control impact through conditions on permits; education and information for operators and visitors to improve understanding and minimise impacts.
Benefits	Sustainable development; reputation for quality tourist experience in a protected natural environment.
Activity	Habitat preservation, scientific research
Threats/Problems	Increasing levels of use of the Great Barrier Reef; illegal entry; major degradation from accidental impacts (e.g. oil spills), incidental impacts (terrestrial run-off); need for minimally disturbed reference and research sites.
Management Response	Zone uses; set aside scientific research and preservation zones; enforce regulations; monitor environmental conditions, human use and the impact of use; support management-related research.
Benefits	Ecosystem maintenance through effective management.

THE GREAT BARRIER REEF MARINE PARK - TOWARDS 2000 AD

In some ways the Great Barrier Reef Marine Park is an experiment on a grand scale. Nevertheless, principles are being followed in its development which have often been successfully applied to regional planning in the terrestrial sphere. The Marine Park is now seen as a model for marine resource management and each year the Authority receives many requests for technical assistance from countries around the world.

There is, in the main, considerable public satisfaction about the role and actions of the Authority. A survey of users of the Capricornia Section after five years of operation found that 63-90 per cent agreed that zoning, helped to protect the Reef, and 50-73 per cent agreed that the zoning plan was a wise use of public money. (7)

The successes achieved so far in managing the Great Barrier Reef Marine Park have been due largely to a range of legislative and administrative arrangements which have been accompanied by strong commitments to gathering the necessary information for planning, by consulting all user groups and with an extensive education and information program promoting 'wise use' to the Australian community. Maintaining this community support at a high level is essential for the Marine Park to succeed in attaining its fundamental objective - long term harmony between human activities and the conservation of the Great Barrier Reef.

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This page last updated 18 June 2009

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